Space Weather Forecast

Issued on Friday, 17 February 2023 at 13:26 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1-G2 Minor/Moderate Storms likely due to coronal mass ejection arrival forecast later day 1 (17th), continuing day 2 (18th). Chance of M-flares throughout (R1/R2 Radio Blackouts).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Low with only common class flares observed, with the largest of these a long-lasting flare from the new sunspot in near the northeast limb. This region is gradually rotating into view, and due to its north-south alignment of spots, has the potential for instability. Further complexity may also become apparent over the coming 24 hours. There are a total of six sunspot regions on the visible solar disc. The largest, just west of centre disc, has simplified a little, and remains inactive. The other regions generally mature and either stable or declining. No Earth-directed coronal mass ejections (CMEs) have been observed in available imagery in the last 24 hours.

Solar Wind / Geomagnetic Activity: Solar winds continued to be indicative of the fast winds from a coronal hole. Observed speeds remained slightly elevated to elevated ranging between 450 and 550 km/s. The total magnetic field strength declined from initial Strong levels, to be Moderate until 17/0100 UTC, then became weak. The north-south component soon rotated from being strongly negative (southward) to be Moderate positive (Northward) between 16/1430-17/0130 UTC, before becoming weak and variable. Geomagnetic activity was initially Active (Kp4) 16/1200-1800 UTC, then became Quiet to Unsettled (Kp 0-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was at background levels with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate to Low activity is forecast with a chance of isolated Moderate flares. The main risk for significant flaring is the new sunspot near the northeast limb. A new region is also expected to soon rotate over the southeast limb.

Solar Wind / Geomagnetic Activity: A CME which left the Sun on 15th is forecast to arrive at Earth around 17/1800UTC +/- 12 hours. Solar winds are expected to be slightly elevated to elevated as this arrives, at around 500 km/s, with ongoing CME effects then persisting day 2 (18th). Enhanced solar winds likely declining day 3 (19th), before a further enhancement then occurs later day 3 or day 4 (20th) due to the potential arrival of further coronal hole sourced fast solar winds.. Geomagnetic activity is expected to be Quiet, isolated Unsettled at first, increasing to Active to G1 Minor Storm, with a chance of G2/Moderate Storms, with the CME arrival later day 1 and likely continuing day 2 (17th and 18th). Activity is then expected to gradually ease day 3 (19th), to Quiet to Unsettled with Active intervals, but still a chance of further G1/Minor storms. This would normally give a chance of visible aurora to the north of Scotland overnight on day 1 into day 2, however cloud amounts are likely to limit the visibility of the northern horizon to Shetland.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy

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protons) is expected to remain at background levels with no solar radiation storms occurring.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	60	60	30	10
Strong	G3	No	10	10	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	40	40	40	40
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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